ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of:	)	
	)	
Usage of the Public Switched	)	CC Docket No. 96-263
Network by Information Service	)	
and Internet Access Providers	)	

COMMENTS OF GTE

GTE SERVICE CORPORATION,
on behalf of its affiliated
domestic Strategic Business Units

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GTE Service Corporation ("GTE"), on behalf of its affiliated domestic Strategic Business Units ("SBUs"),[1] offers the following comments in the above-captioned proceeding concerning usage of the Public Switched Telephone Network ("PSTN") by information services and Internet access providers.[2] In its *Notice of Inquiry* ("*NOI*"), the Commission seeks the views of interested parties with respect to: (1) local exchange carrier ("LEC") cost recovery; (2) the efficient transport of data traffic; (3) network congestion; (4) barriers to alternative network access arrangements; and (5) distinctions, if any, between different categories of information or enhanced services.[3] As discussed below, GTE submits that the

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[1] GTE is a world leader in the provision of wireline, wireless, Internet and directory services.

[2] *Access Charge Reform, Price Cap Performance Review for Local Exchange Carriers, Transport Rate Structure and Pricing, Usage of the Public Switched Network by Information Service and Internet Access Providers*, Notice of Proposed Rulemaking, Third Report and Order, and Notice of Inquiry, 1996 FCC LEXIS 7105, 5 Comm. Reg. (P & F) 604 (rel. Dec. 24, 1996) (*"Access Charge NPRM"*).

[3] *Id.* ¶¶ 311-318.

network congestion problems in the Local Exchange Carriers' ("LECs'") telephone networks caused by increasing Internet access usage are real, costly to resolve, and likely to continue to grow exponentially. Accordingly, GTE welcomes this inquiry and urges the Commission to develop and implement a rational pricing policy for all interstate services under which all users pay the actual costs of their use of the PSTN, or in the alternative, LECs receive explicit universal service funding in accordance with the Telecommunications Act of 1996 (the "Act")[4] to compensate for any shortfall in cost recovery that may result from limitations on prices as a result of public policy decisions.[5]

I. INTRODUCTION AND SUMMARY

The issues raised in the *NOI* constitute one piece of a major restructuring of the Commission's access rules necessitated by the deregulatory policies embodied in the Act. GTE shares the Commission's goal of promoting the technological evolution of the network and the offering of information services in an economically efficient manner. However, this can only be achieved in a regulatory and a market environment characterized by correct economic signals, incentives for efficiency and, where necessary, explicit support payments. explicit subsidies. Reform of the rate structures applicable to Internet Service Provider ("ISP") use of the PSTN must be accomplished consistent with these critical principles.

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[4] Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996) (to be codified at 47 U.S.C. §§ 151 *et seq.*).

[5] Comments of GTE, CC Docket No. 96-262, at v.

In these Comments, GTE reaffirms its strong commitment to the use and development of the Internet. As GTE is a LEC, an ISP, and a wholesaler of Internet access service, it understands that the problems associated with ISP use of the PSTN are multi-faceted and of critical importance to many industry participants. Only a resolution of these problems based on fundamental economic principles linking cost causation and cost recovery can properly promote the public interest by encouraging the deployment of the necessary advanced telecommunications infrastructure on which this exciting new medium depends.

GTE has collected data that prove that Internet usage creates a serious problem for the PSTN. Because the PSTN was designed for voice traffic, which exhibits dramatically different calling patterns and usage characteristics than Internet access data traffic, the recent increase in Internet-related calls is creating congestion at critical points in the network. The Internet Access Coalition attempts to deny the existence of any congestion problem through a funded study entitled "The Effects of Internet Use on the Nation's Telephone Network," authored by Lee Selwyn and Joseph Laszlo (the "Selwyn/Laszlo Study"). Careful examination will show that the Selwyn/Laszlo Study suffers from a number of fatal defects in its engineering, economic, and traffic analyses, and is wholly unable to rebut GTE's well-documented showings.

Moreover, there is every reason to believe that Internet use will continue to rise dramatically, causing an already difficult congestion problem to become worse. In order to maintain network integrity, LECs have had to expend substantial and unplanned sums to increase network capacity, and those expenditures will only increase in the future. Yet, existing regulatory policy precludes appropriate recovery of these costs.

The flat-rated nature of the network services purchased by ISPs and their customers prevent LECs from recovering the actual network costs of these services. As a result, ISPs and their customers have no incentive to act in an economically efficient manner. Instead, the heavy subsidy of their use of the analog telephone service undermines incentives to purchase appropriately priced, more efficient data services. At the same time, the Commission's new competition policies foreclose the LECs from finding other revenue sources from which to recover the huge unplanned infrastructure investments incurred in response to increased Internet usage of the PSTN. ISPs' arguments to preserve this status quo interminably must, therefore, be rejected.

GTE submits that the Commission must adopt a comprehensive and consistent pricing regime for interstate services based on the principle of cost recovery from cost causers with explicit, targeted support payments to providers from the Universal Service Fund where public policy dictates an exception from this cardinal rule. Ubiquitous application of such a pricing policy will send the appropriate economic signals to the industry and ensure the most efficient and productive development of public networks and Internet services.

II. GTE IS COMMITTED TO THE REALIZATION OF THE INTERNET'S POTENTIAL AND TO THE DEVELOPMENT AND IMPLEMENTATION OF NEW TECHNOLOGIES

GTE is not only a LEC, but also a major participant in the Internet community through GTE Intelligent Network Services ("GTE INS"). GTE's LECs are among the country's larger wholesalers of Internet access services and are committed to making access to these and other new technologies available to their customers. This is demonstrated by the growing

sophistication of their service offerings, the level of their investment in new technologies, and the ongoing process of network upgrades to permit all Internet users to make efficient and effective use of GTE's telephone network.

Nearly 2,000,000 GTE telephone customers now use the Internet. GTE LECs also are continuing the aggressive deployment of "data friendly" technologies including Integrated Services Digital Network ("ISDN") and Asymmetrical Digital Subscriber Line ("ADSL") technologies. To date ADSL, while still an experimental technology, has been well received by the trial participants. GTE Laboratories and switch vendors are pursuing various ADSL and fiber-to-the-curb voice/data combination services in addition to ISDN and ADSL technologies. GTE is a leader in the deployment of these technologies and will continue its commitment to the latest technologies for data transmission as a top priority.

While the deployment of ISDN creates network efficiencies at the two ends of a telephony Internet access connection, ISDN does not improve the efficiency of the interoffice transmission segment of a call. Interoffice transmission capacity requirements are the same for standard voice transmission as for ISDN. The CyberPop^{SM} a service offered by GTE is analogous to ISDN for interoffice capacity utilization, but the additional network efficiency it provides affects the portion of the call path between the wire center and the ISP's network. ADSL and like services are nascent technologies that very likely will provide improved speeds and coincident reductions in required network capacity. But, the question of timing for the deployment of such Digital Subscriber Line ("DSL") technologies in a quantity sufficient to affect the usage of telephony capacity, given increasing subscription to overall Internet access, concerns GTE because it is not likely that near term deployment will sufficiently relieve

telephony network capacity additions. As will be detailed later, the economic attractiveness of subsidized residential dial tone services impedes customer selection of "data friendly" technologies, because the customer benefit must now exceed the cost difference between the services plus the subsidy.

Additionally, GTE INS is a major Internet provider, serving over 100,000 customers.[6] In a recent press release, GTE INS announced a substantial Internet network expansion for 1997. GTE INS will provide additional dial-up numbers and will begin offering Internet access in 120 new markets. These efforts will at least double, and in many cases quadruple, GTE INS customers' ability to access the Internet in the more than 500 markets that it will serve.

GTE is not alone in offering Internet access and other online services. AT&T, MCI, Microsoft and other companies have embarked on major marketing campaigns for their Internet access offerings in the last year. Smaller Internet access providers, such as Erol's in the Washington D.C. area, are proliferating. All the major online services are promoting the Internet and other information products. As a result, Internet traffic volume is exploding.

GTE's own actions demonstrate that it supports bringing the benefits of the Internet and the Information Age to the public. The Commission can best support this goal by creating a sound economic and regulatory environment within which the Internet and related technologies can thrive. Conversely, it should exercise caution when establishing a regulatory regime that could impede technological progress or result in the denial of these services to the public.

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[6] GTE INS was the first LEC Internet affiliate to reach the 100,000 customer mark.

The FCC also needs to consider the impact of its ISP policies in the larger context of the telecommunications industry as a whole. Absent the establishment of appropriate pricing arrangements that permit recovery of the costs of serving ISPs and their customers, LECs will lack the resources to address the increasing demands placed on their networks. In that event, not only the LECs, but all users of their networks will suffer from a deterioration in performance and the unavailability of sophisticated technological capabilities. This cannot be the result sought by the Commission.[7]

As discussed in greater detail below, GTE and other LECs - whose networks remain critical to realization of the FCC's universal access policies for the Internet - will find it difficult, if not impossible, to maintain their commitments to those policies if the existing uneconomic regulatory regime is maintained. The Commission must find a solution that accommodates cost recovery for the LECs while ensuring that ISPs continue to prosper. This will best ensure that the American public, regardless of whether they reside in metropolitan or rural areas, has affordable access to new, innovative services.[8]

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[7] *Cf. NOI*, ¶ 311.

[8] GTE is currently involved in negotiations with various state government officials in order to provide rural communities with local dial Internet access service in a manner that is beneficial to individual subscribers and is not detrimental to GTE.

III. INTERNET USAGE CREATES A DEMONSTRABLE PROBLEM FOR THE LECS' NETWORKS

A. The Congestion Caused by Internet Calling, Holding Times, and Traffic Patterns Is an Increasing Problem

An internal GTE study of Internet access usage of the PSTN reveals the same conditions that several other LECs have experienced: heavy Internet traffic is causing a congestion problem for LEC networks.[9] The LECs' networks were designed primarily to accommodate voice traffic patterns. The data traffic associated with access to the Internet has different attributes than that of voice traffic. Because the LEC networks were not designed to handle the volume of data traffic and long holding times generated by Internet usage, LECs are struggling to maintain consistently high quality network service under an ever-increasing burden of Internet-related communications.[10]

To understand the congestion problem, it helps to break down a switched access call to an ISP into three links. (See Figure 1).[11] The first link is the end user's loop to end office switch serving that end user. The loop and switch line port dedicated to the end user are non-traffic sensitive and do not contribute to the congestion. However, congestion can occur in the connection between the line port and the rest of the end office switch (the traffic sensitive portion). The second link is the interoffice trunk (or facility) connecting the end office switch

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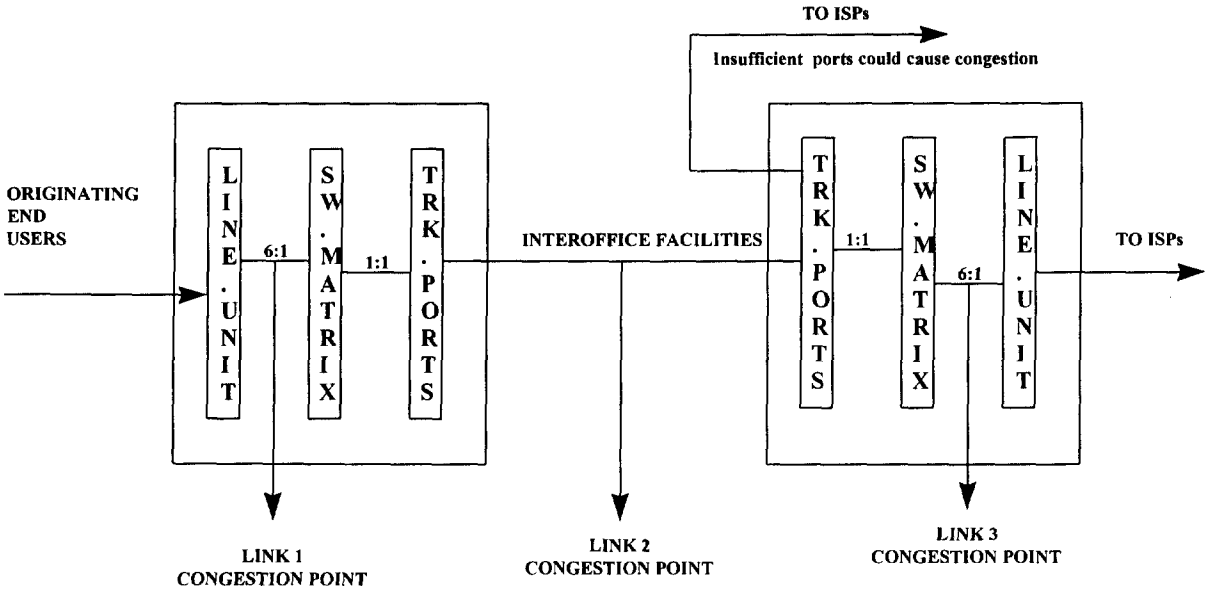
[9] *See NOI*, ¶ 315 (" We encourage commentators to provide data on the characteristics of information service usage and its effects on the network").

[10] Network congestion affects voice services as well as data traffic.

[11] For a more detailed representation of congestion points on an ISP access call, see (Continued...)

and the ISP serving wire center. This link is highly susceptible to congestion created by unprecedented growth in traffic volumes and holding times 4-5 times longer than those for which the network was designed. The third link is from the serving wire center to the ISP premise. Congestion in this link predominantly occurs when the ISP is served via a line-side connection (or line) as opposed to a trunk-side connection. A trunk-side connection has the potential for congestion, but it is much less than that for a line-side connection.

FIGURE 1: NETWORK CONGESTION POINTS



At current traffic levels, GTE has addressed congestion problems in the first link (end user to end office) by rebalancing the assignment of end users to end office line unit equipment so that heavy users of the network are distributed more evenly. Similarly, GTE has addressed

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(...Continued)
Attachment B.

the congestion in the third link (serving wire center to ISP premise) either by encouraging the use of trunk-side access, to which many ISPs in GTE territory currently subscribe, or by the same rebalancing technique described above. As a result of these efforts, congestion in these links has been largely manageable in GTE's network, but not without substantial cost. However, the network capacities of these links are limited and rebalancing traffic is a costly and at most a temporary solution. It is reasonable to expect that, given the tremendous growth projections for Internet usage, these links will begin to experience congestion problems requiring additional network investment in the not too distant future. [12]

It is the increased demand for interoffice capacity (the second link) due to Internet access that has become the primary cause of network congestion for GTE. GTE's efforts to control congestion on this link overshadow its expenditures for the first and third links combined. The increasing congestion of interoffice facilities stems from the ISPs' desire to secure the widest possible local calling area for their customers. As discussed in more detail below, the longer holding times and heavier traffic volumes associated with Internet calls, and the fact that other techniques such as rebalancing and trunk-side access are not available to alleviate congestion on interoffice facilities, have required the LECs to make substantial investments in end office switches and interoffice spans on these links.

As set out in the attached affidavit, an internal study revealed that in 1996, GTE customers that accessed the Internet generated an additional 954,580 to 1,527,320 total CCS

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[12] *See NOI*, ¶ 313 ("We invite parties to identify means of addressing the congestion concerns raised by incumbent LECs, for example by deploying hardware to route data traffic around incumbent LEC switches . . . .").

on average during the daily office busy hour.[13] The interoffice segment of these Internet access calls generated 763,660 to 1,374,580 total CCS on average during the daily office busy hour.[14]

In addition, GTE conducted six studies of ISP holding times during 1996. The results of these studies are summarized in the following table:

	December 1996 Study Number 1	December 1996 Study Number 2	September 1996 Study	August 1996 Study	April 1996 Study	January 1996 Study
Average Holding Time For ISP Call	16 to 17 Minutes	21 Minutes	14 to 15 Minutes	12 to 15 Minutes	12 to 15 Minutes	12 to 15 Minutes
Average Holding Time For Voice Call	3 to 4 Minutes					
Number of ISPs Studied	25 ISPs	9 ISPs	13 ISPs	16 ISPs	5 ISPs	6 ISPs

[13] "CCS" stands for "centum or hundred call seconds." A single line has a maximum capacity of 36 CCS per hour because there are 3600 seconds in each hour. CCS is an engineering metric which is commonly used to measure actual traffic loads, as well as the maximum capacities on traffic sensitive elements of the network. The numbers are based on the assumption that the time sensitivity of much of the information accessed via Internet services (such as stock quotes, news, weather, and email) suggest that Internet usage will be spread throughout the day and that 5-8 percent of GTE's Internet users will access the Internet during the office busy hour. Typically telephone networks are engineered for a network capacity that would accept 2.5 CCS per line during the office busy hour. The total busy hour load in GTE's network is over 43,000,000 CCS. The number of Internet users coupled with their average holding times results in usage that approximates 3 percent of the total engineered busy hour capacity of the network. *See* Attachment B, Affidavit of Alton Blackmon.

[14] *See NOI*, ¶ 315 ("We encourage commentators to provide data on the characteristics of information service usage and its effects on the network").

As the study results show, the average holding time for an ISP call is 15-16 minutes. The average holding time for a voice call is only 3-4 minutes. This means that on average, ISP related calls are approximately 12 minutes, or up to *400 percent*, longer than voice calls.[15] In turn, these increased network demands translate into a requirement for additional network equipment purchases at substantial cost.[16]

GTE has already begun further studies of these issues. These new studies will take advantage of new technologies and equipment that allow a LEC to monitor traffic in its end office with greater precision than was available previously. With this equipment GTE will measure traffic terminating to particular trunks and lines, as well as measure the overall traffic load destined for the end office serving those customers. GTE hopes that the data gathered by these studies will present a clear picture of Internet access traffic in specific offices compared to all other traffic in those offices.

The following table summarizes data gathered in a three day study of one of GTE's offices.[17] It is offered as an example of the type of data that can now be gathered with this

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[15] The ISP traffic studies conducted by other LECs confirm the legitimacy of this data. *See* "Report of Bell Atlantic on Internet Traffic" (June 28, 1996); "Pacific Bell ESP Impact Study" (July 2, 1996); Letter from NYNEX to James Schlichting, Chief, Competitive Pricing Division, FCC (July 10, 1996); "U.S. West Communications ESP Network Study - Final Results" (Oct. 1, 1996); Amir Atai and James Gordon, "Impacts of Internet Traffic on LEC Networks and Switching Systems" (1996).

[16] *See NOI*, ¶ 315 ("We encourage commentators to provide data on the characteristics of information service usage and its effects on the network").

[17] The study was performed from March 3-5, 1997. Thirty-eight and a half total hours and seven ISPs were studied.

new technology. A quick review of the data indicates that further studies will be able to identify total network usage for specific identified numbers, such as an ISP office, as well as the total network usage for all other numbers served by the end office. This will provide, for the first time, the ability to determine both the volume of traffic accessing the Internet as a percentage of the total traffic volume in the end office, and the holding times and completion rates[18] for each type of call. The results of these new studies will be provided for the record when available.[19]

	Completed Calls	Duration in Minutes	Average Holding Time in Minutes	Busy Calls	Percent Completed Calls	Percent of Total Traffic
ISP Traffic	19,755	322,582	16.33	56,258	25.99%	18.81%
Non-ISP Traffic	394,051	1,392,609	3.53	44,826	89.79%	81.19%
Total Traffic	413,806	1,715,191	4.14	101,084	80.37%	100.00%

[18] While this is only a limited three day study, the completion rates studied indicate that blockage problems on ISP networks are limiting Internet traffic's impact on the PSTN. When ISPs improve their low completion rates by augmenting their infrastructure, the total ISP traffic in the office studied would likely have been even greater that the 19 percent shown in the data.

[19] *See NOI*, ¶ 315 ("We encourage commentators to provide data on the characteristics of information service usage and its effects on the network").

B. The Selwyn/Laszlo Study Does Not Accurately Reflect LEC Engineering Methods and Understates the Impact of the Congestion Problem

A recent study, "The Effect of Internet Use on the Nation's Telephone Network," financed by the Internet Access Coalition (the "Selwyn/Laszlo Study") claims that the Internet does not pose a serious risk to the PSTN. This study's results, however, are marred by incomplete research and faulty assumptions

Congestion causes unanticipated expenditures. The Selwyn/Laszlo Study points to the fact that "very few congestion problems . . . have been identified as affecting the telephone network" as evidence that "[d]ata communications traffic currently poses no significant threat to network integrity."[20] It is true that few congestion problems have occurred, but this is only true because of the dedication of LECs to the provision of quality service and their careful monitoring and quick action to prevent users of the network from encountering blocked calls.

Interoffice trunk groups are routinely studied and planned additions are made as the traffic load increases. Planning for normal growth patterns is built into the LEC's interoffice facility construction budget. However, with the unprecedented growth caused by Internet access traffic, unplanned out-of-cycle expenditures have become necessary to augment the network to maintain a P.01 grade of service to accommodate customer demand.[21] After

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[20] Selwyn/Laszlo Study at vi.

[21] Trunking service objectives for LEC networks generally require trunk groups to be engineered for a blocking probability of .01. This means that one in one hundred calls on that particular trunk group may experience a blockage during the busy hour. *See BOC Notes on the LEC Networks – 1994*, SR-TSV-002275, Issue 2, April 1994, Section 4.4, at 4-24.

making emergency additions to their networks to maintain an acceptable grade of service as a result of the volume of Internet access traffic, the LECs now must make additional expenditures to ensure that there is enough capacity for the normal projected growth of the network.[22]

Traffic within the ISP system affects the PSTN. The Selwyn/Laszlo study also attempts to minimize the congestion attributable to ISPs by asserting that congestion within an ISP's system only affects those users of the PSTN that are attempting to access that particular ISP.[23] This is wrong. First, congestion caused by an insufficient number of ISP lines (or trunks) between the serving wire center and the ISP's premise does affect users of the PSTN that are not attempting to connect with that particular ISP. An insufficient number of lines/trunks to the ISP results in ineffective network attempts. When an end user reaches a busy signal, usually another call attempt is immediately made, and another and another until the connection is made. These ineffective call attempts occupy network resources until the network can determine that there are no lines/trunks available to access the ISP. The network resources tied up by end users attempting to access the ISP are not available for use by other end users attempting to place voice calls and can result in all circuits busy signals to both the voice and Internet callers. Second, if an ISP fails to provide a sufficient backbone network, transmission and reception to and from its Internet servers is less than optimum and end users

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[22] In one local calling area in Washington State, trunk additions totaling 55 percent of the existing in-service trunk capacity were required to sustain an acceptable grade of service to our customers.

[23] Selwyn/Laszlo Study at 7.

will be unable to access or transfer data at the maximum speed of their modem. This increases holding times on Internet calls. These longer holding times, in turn, use telephone company network resources for the entire period the Internet call is in progress, making those resources unavailable for other users.

Interoffice trunk capacity is limited. The Selwyn/Laszlo Study also bases its conclusions on a misunderstanding of LEC engineering of interoffice trunks. The study appears to assume that there is an infinite quantity of trunks between any two end office switching locations because it states that "any customer that can place a call at the originating switch will have an interoffice trunk available that can establish a route to the desired terminating switch of the call."[24] In fact, the "rare" cases when all such trunks are in use and not available[25] are becoming much less "rare" with the growth of traffic over this network to ISPs. These interoffice trunk groups are generally engineered at a P.01 grade of service based on the typical calling patterns of that particular trunk group. These traffic patterns are changing dramatically as a result of traffic destined for ISPs. With the longer holding times of Internet access calls as compared to voice calls, the normal busy hour is now showing a demand for additional interoffice trunks throughout the LECs' networks.

If Internet and voice traffic peak at the same time of day, then the trunk group must be sized to accommodate the combined traffic for that particular busy hour. If Internet and voice traffic do not peak at the same time of day, then the trunk group must be engineered for either

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[24] Selwyn/Laszlo Study at 8.

[25] These cases are "rare" only because quick network planning and emergency fixes have accommodated past levels of usage. As usage increases this will not be the case.

the Internet or voice busy hour, depending upon which experiences the peak traffic load. In either case, it is incumbent upon the LEC to determine the increased traffic load attributable to Internet traffic in order to accurately reflect the increased cost for interoffice facilities caused by traffic to the ISPs. It is true that if the busy hours are non-coincident and the ISP busy hour traffic is less than the voice busy hour traffic, then no additional trunks are required. However, traffic studies to date indicate that the ISP traffic is causing an increase in the average holding time of trunks during the engineered peak busy hour.[26]

SS7 alone is not a solution. In another attempt to show that congestion within an ISP's system will not affect the larger world of PSTN users, the Selwyn/Laszlo Study assumes that the use of a common channel signaling architecture like Signaling System 7 ("SS7") alerts ISP customers that the ISP system is overcrowded without congesting the PSTN for other users.[27] This assumption is erroneous. In fact, even though the SS7 network notifies the originating end office that the dialed number is busy, the voice circuit between the switching entities is reserved for the period of time required to determine that the dialed number is in fact busy. No other traffic has access to the reserved facilities. Further, calls to the ISP originating within the serving wire center of the ISP (*i.e.*, where the end user is served by the same switch as the ISP) do not use SS7 signaling, therefore a voice path is set up within the switch.

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26 *See supra*, 11-13.

27 Selwyn/Laszlo Study at 7, n.13.

The study also fails to address the impact of the ineffective call attempts (calls that are not completed) created by the ISP's customer as a result of busy signals and subsequent redialing to the ISP's number. As noted above, this does, in fact, cause problems in the network. Ineffective attempts generated by automatic dialing techniques in users' computers are commonplace today, thereby creating a large number of reattempts in a very short time frame.

Upgrades produce significant costs. The study also suggests that various engineering solutions are available to ensure that peak usage does not overwhelm the PSTN – but consistently fails to recognize the substantial costs of these upgrades.[28] For example, the study suggests that "[a]dditional traffic capacity can readily be augmented either by installing additional electronics on working ('lit') [fiber optic] strands, or by equipping 'dark' strands with electronic terminating gear."[29] The electronics necessary for such upgrades are a substantial cost for LECs. Moreover, merely augmenting the interoffice facilities with additional electronic gear is not sufficient to reroute traffic from the switch onto the additional facilities. As a result, it is also necessary to add trunk port equipment to the switching equipment. Installing these trunk port facilities is an additional substantial cost.

Congestion occurs in the interoffice trunking portion of the network, not in the LCM. The study asserts that non-blocking architectures can cure increased traffic loads caused by Internet calls. This assertion is premised upon the assumption that the Line Concentration

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[28] Selwyn/Laszlo Study at 9, 11.

[29] Selwyn/Laszlo Study at 11.

Module (the "LCM") is the "switch component where blocking is most likely to occur."[30] In fact, although accommodation of congestion in any of the three links comprising an Internet-related call is expensive, the most costly link on which to correct congestion is the interoffice trunking, or second link, as described above. Blocking will only occur in the LCM if all 180 paths served are in service at the same time. Thus far, LECs have managed this type of congestion. In contrast, congestion in the interoffice trunking link requires costly equipment upgrades to maintain quality service and avoid congestion.

* * *

Because of these major flaws in the Selwyn/Laszlo Study, the Commission should not give credence to its conclusion that ISP traffic does not raise serious concerns about network integrity. In fact, there is every reason to believe that Internet access, and the network congestion that accompanies it, will become even more of a danger to network integrity in the future. A recent study conducted by Nielsen Media Research and CommerceNET showed that close to one quarter of the US and Canadian population, or about 50.6 million people, now access the Internet.[31] This represents a 100 percent increase in just 18 months.[32] A recent Solomon Brothers study estimates that the number of people who access the Internet will reach 160 million in the next three years.[33] This continued exponential growth will compound

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30 Selwyn/Laszlo Study at 11, n.20.

31 *See* Rajiv Chandrasekaran, *Internet Use Has More Than Doubled in Last 18 Months, Survey Finds*, Wash. Post, Mar. 13, 1997, at D3.

32 *See id.*

33 *See* Kevin Maney, *Web in crisis? Gridlock on info highway*, USA Today, Jan. 20,

(Continued...)

congestion on the PSTN. As Matt Cutler, the founder of web.Genesis, which measures performance of the World Wide Web, has stated, "[i]t's a race between users and the infrastructure . . . The question is, who's going to win? The answer is, it's probably going to be a race for a long time."[34]

C. Substantial Investments in LEC Infrastructure Have Been and Will Continue To Be Needed To Avoid a Potentially Crippling Overload of the Network

GTE's data on total CCS generation and the length of Internet access calls show that ISP-access traffic causes congestion. This congestion has had and continues to have a serious impact on GTE's network.[35] As explained above, the LECs' networks were engineered primarily to accommodate voice traffic. Voice traffic customers typically generate between 1.8 - 2.4 CCS per line, and holding times average 3 to 4 minutes. End office equipment (line units) are typically engineered on a 6:1 concentration ratio, which means that there is one path

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(...Continued)
1997, at 1B. *See also* Louise Kehoe, *Home telephones under siege: Internet users are stretching the US phone network to breaking point*, Financial Times, Feb. 1, 1997, at 7 ("'Internet usage is predicted to grow more than 700 per cent by the year 2001,' says Mr. Roy Neel, president and chief executive of the US Telephone Association, an industry trade group. 'Someone has to pay for that usage, the subsequent wear and tear on the network and the new equipment.'").

[34] Kevin Maney, *Web in Crisis? Gridlock on info highway*, USA Today, Jan. 20, 1997, at 1B.

[35] *See NOI*, ¶ 313 ("We invite parties to identify means of addressing the congestion concerns raised by incumbent LECs, for example by deploying hardware to route data traffic around incumbent LEC switches . . . .").

to the switching matrix for each six incoming lines.[36] Each path has an engineered capacity of approximately 28 CCS. Based on these capacities, each path is capable of carrying between 11 and 15 voice calls per hour. A typical line unit in GTE's network can handle approximately 980 lines and, therefore, has the capability of carrying between 1,800 and 2,465 voice calls per hour.

Internet calls create traffic levels that would overload a system engineered on this 6:1 ratio. ISP traffic generates 9 - 9.6 CCS per line on average, and ISP holding times average 15-16 minutes. If only 78 of the lines served by a typical line unit are used to access an ISP, the concentration ratio of the line unit goes up to 6.3:1. This means that only 900 lines can be handled by the same piece of equipment that previously handled 980. As traffic to the Internet continues to increase, this problem will increase. If the network configuration which existed at the time the FCC created the ISP access charge exemption were used to accommodate today's influx of data traffic, the system would be overwhelmed. Without significant and expensive additions to the network architecture, service quality will suffer and service outages, which could include an inability to access critical services like the 911 emergency system, could occur.

In order to avoid service degradation and outages due to Internet access growth, GTE has made a significant investment in new equipment and equipment upgrades above and beyond its annual budgeted investments in the network, and will be required to continue to

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[36] This concentration is very typical of the needs of a normal voice network.

make large expenditures in the foreseeable future.[37] Accumulated Internet traffic through the end of 1996 has required GTE to install between 207 and 331 switch line units, resulting in a total switch upgrade cost of between $34.4 million and $55 million. Additionally, GTE has supplemented its interoffice facilities with between 27,273 and 49,092 trunks, resulting in an upgrade cost of between $15.9 million and $28.6 million. In total, GTE has thus expended between $50.3 million and $83.6 million in direct support of its efforts to avoid a potentially crippling overload of its network as a direct result of increased ISP traffic. This information is summarized in the following table:

	Incremental Traffic (CCS)		Incremental Units		Incremental Costs	
	Low Range	**High Range**	**Low Range**	**High Range**	**Low Range**	**High Range**
Links 1 and 3	954,580	1,527,320	207 line units	331 line units	$34.4 million	$55 million
Link 2	763,660	1,374,580	27,273 trunks	49,092 trunks	$15.9 million	$28.6 million
Total					$50.5 million	$84 million

Given current traffic growth rates and trends, GTE estimates that it could expend this much in 1997 alone. Unfortunately, as discussed below, existing regulatory policy does not permit GTE to recoup these costs from the cost causers, thereby creating another implicit subsidy system in contravention of sound economic policy and Section 254 of the Communications Act.

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[37] These investments are in addition to GTE's normal, and very substantial, network augmentation efforts.

IV. CURRENT RULES AND POLICIES PREVENT LECS FROM RECOVERING THEIR COSTS

A. Information Service Providers Do Not Currently Pay The Network Costs They Cause

Although ISPs are users of LEC access facilities, they are currently exempt from paying access charges.[38] Because this "exemption" means that ISPs do not have to pay usage based charges for LEC-provided transmission services, it permits ISPs to utilize effectively flat-rated local business services to access the PSTN.[39] In turn, the vast majority of ISPs' largely residential customers also use flat-rated local services to access their Internet offerings. The regulated rates for these services, particularly residential services, are typically set substantially below cost.

Internet access calls cost GTE more than other types of calls because the average duration of an ISP-related call is 15-16 minutes, while the average duration of voice call is only 3-4 minutes. This means that network resources are occupied for four to five times as

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[38] *See Access Charge NPRM* ¶ 284. *See also MTS and WATS Market Structure*, Memorandum Opinion and Order, 97 FCC2d 682, 711-22 (1983); *Amendments of Part 69 of the Commission's Rules Relating to Enhanced Service Providers*, Order, 3 FCC Rcd 2631 (1988). *See also*, *NOI*, ¶ 315 ("We seek comment on the effects of the current system on network usage, incumbent LEC cost-recovery, and the development of the information services marketplace").

[39] The vast majority of residential telephone service offerings are flat-rated. Although many business lines are priced on a usage sensitive basis for outgoing calls, ISPs typically generate few such communications, instead receiving calls from their customers and paying only the basic flat rate portion of the business line charges.